**A1000 Series of Digital Panelmeters User's Manual**

Model A1x1C-xx for Temperature Measurement
- thermocouple sensor

Model A1x1D-xx for Temperature Measurement
- resistance temperature detector


## 1. Check before Use

Thank you for purchasing our A1000 Series Digital Panelmeter. Please make sure that the operator who uses the panelmeter keeps the manual on hand.
Also, the panelmeter should be cheked upon receipt for damage that might have occurred while in transit. Should the product be damaged or any accessory be missing, notify your sales representative or our sales office directly.

## 2. Feature

This product is an equipment only for the display.

## 3. Accessories

This manual (Users manual)
Service manual
One unit label

## 4. Model and Suffix Code Configuration

The model and suffix code of the A1000 series are as shown below.
Check that the product received matches the one you selected when ordering.

A1□1□-□□

- Range
  - KC: Thermocouple-K sensor
    Note: Selectable when the input option is C
  - JC: Thermocouple-J sensor
    Note: Selectable when the input option is C
  - PA: Pt 100Ω/0.1℃
    Note: Selectable when the input option is D
  - PJ: Pt 100Ω/1℃
    Note: Selectable when the input option is D
- Input
  - C: Temperature measurement-thermocouple sensor
  - D: Temperature measurement - platinum resistance temperature sensor
- Power Supply
  - 1: 100 to 120VAC ±10% 50/60Hz
  - 2: 200 to 240VAC ±10% 50/60Hz
  - 3: 5 to 24VDC ±10%

## 5. Specifications

### 5.1 Input Specifications

■ Thermocouple sensor

| Renge | Sensor | Measuring rang | Resolution | Accuracy (23℃±5℃,35to85%) |
|---|---|---|---|---|
| KC | K | 0 to +1000℃ | 1℃ | ±0.8% of FS |
| JC | J | 0 to +400℃ | 1℃ | ±0.8% of FS |

Compensation accuracy : ±2℃
Internal sensor resistance : Less than 50Ω
Burnout warning : -1999
Linearizer : Digital linearizer
Maximum Permissible : ±5V DC

■ Platinum resistance sensor

| Renge | Sensor | Measuring rang | Resolution | Accuracy (23℃±5℃,35to85%) |
|---|---|---|---|---|
| PA | Pt-100Ω | -100.0 to +199.9℃ | 0.1℃ | ±0.2% of FS |
| PJ | Pt-100Ω | -200 to +600℃ | 1℃ | ±0.4% of FS |

Current flowing through resistance : 1mA (TYP)
External resistance : Less than 10Ω/1ead
Maximum Permissible : ±5V DC

### 5.2 Common Specifications

Operation system: Double integration
Input circuit : Single-ended type
Input bias current: 50pA (TYP)
Sampling rate : 2.5times/sec
Over range warning: A blinking indication of "1999" with respect to input signals
Display : 7-segment numerical LED elements, red, character height of approx 14.2mm
Zero indication : Reading-zero suppresion
Maximam reading : 1999
Decimal point : Can be set freely using the selector socket behind the front panel
External control: The hold function is enable when the HOLD and COM terminals are shorted or thier potentials are bought to the 0V level
Operating tempetarure
humidity ranges : 0 to 50℃/35 to 85%RH
Storage temperature
humidity ranges : -10 to 70℃/60%RH or less
Weight : 150g (TYP) for AC powered models
: 85g (TYP) for DC powered models
Withstand voltage: 1,500VAC for one miute between the power terminal and each of the input terminals (for AC powered models)
: 500VDC for one minute between the power terminal and each of the input terminals (for DC powered models)
Insulation resistance: 100MΩ or more 500VDC between the above roted terminals
Conformity standard: EN61326-1 (2006)
EMI/classA, EMS/Controlled EM environments
: EN61010-1 (2001)
(However, 14 range is excluded)

watanabe
WATANABE ELECTRIC INDUSTRY CO., LTD.
6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
Phone: (81)3-3400-6141
Homepage http://www.watanabe-electric.co.jp/en/

## 1. Introduction

This manual is to ensure safe and correct use of product. Be sure to read this manual prior to use. Make sure you correctly understand the content when you use the product.

## 2. Precautions

To ensure safe use of the product, precautions are indicated by the following symbol marks. Be sure to observe the precautions.

| | |
|---|---|
| ⚠ WARNING | **Indicates a potentially hazardous situation which, if mishandled, could result in death or serious injury to the user and/or severe damage to property.** |
| ⚠ CAUTION | **Indicates a potentially hazardous situation which, if mishandled, could result in injury to the user and/or damage to property.** |

### ⚠ WARNING

- Do notdismantle the unit to carry out modification or repair work. Doing so may result in fire, electric shock, or injury.
- Be sure to provide an external breaker to ensure the power is cut off in the event of this product or other equipment malfunctioning.
- Be sure to use the product within its rating. Using the product in ways other than specified may result in a failure of the protection provided for the product.

### ⚠ CAUTION

- Use the product in the specified operating environment.
  Using the product in an environment that exceeds the specification range may cause a malfunction or failure.
- Be sure to use the product within its ratings.
  Using the product in a manner that exceeds the specification range may cause a malfunction or failure.
- Do not insert any object via the ventilation holes, etc.
  Doing so may cause a malfunction or failure.
- When cleaning the display and other parts, do not use substances like thinner, benzine, acetone, and kerosene. Make sure the device is turned off and then wipe it with a soft cloth.

### Other

- Watanabe Electric Industry takes no responsibility for special, indirect, and negative dameges caused by the use of this product.
- For safety, do not use this product for the purpose of directly sensing a human body.
- When using this product in combination with other products, customers themselves need to ensure compliance with applicable standards, laws, and regulations.
- The copyright of this document belongs to Asahi Keiki, it is prohibited to reprint, copy, or modify this document in part or whole without permission of Watanabe Electric Industry.
- Specifications, designs, and other information included in this document may be changed due to modification without prior notice.
- Before use, ensure the safety of equipment and devices.
  When using this product under conditions of in an environment not mentioned in this document, or when considering using this product for applications that may have great impact on human life and properties, therefore, requiring special safety, for example, unclear energy control, railway, aviation, vehicles, fuel systems, medical equipment, entertainment equipment, and safety equipment, ensure that the product is used well below its rated parameters and performance limit, and give consideration to fail-safe and other safety measures.

## 3. Operating Environment

- Installation location :Indoors only ■Rated altitude :Up to 2000m
- Transient overvoltage :Impulse withstand category Ⅱ
- Degree of contamination :2
- Operating temperature and humidity ranges :0 to 50℃/35 to 85%RH
- Storage temperature and humidity ranges :−10 to 70℃/60%RH or less
- Vibration(resistance) :10 to 55Hz, (0.15mm single amplitude)X, Y, and Z directions
- Protective structure :IP40 or equivalent

## 4. Accessory

This book(Service maual)
User manual
one unit label

## 5. Warrantly and After-sales Service

Warrantly
The warrantly period of the product is one year from the date of delivery. If a failure occurs during this period that is assumed to be caused by a defect ascribable to Watanabe Electric Industry, we will repair such a failure or replace the defective part free of charge.
After-sales Service
The product has been manufactured, tested, and, inspected under strict quality control conditions before shopment. Should the product break down, contact(send it to) your sales representative or our sales office directly. (In such instances, make a detailed note of the problem and enclose it with the product.)

## 6. Model and saffix Code Configuration

**A1□1□-□□**

**Range**
- 11:±199.9mV Note: Selectable when the input option is 1 only
- 12:±1.999V Note: Selectable when the input option is 1 or 4
- 13:±19.99V Note: Selectable when the input option is 1 or 4
- 14:±199.9V Note: Selectable when the input option is 1 or 4
- 23:±19.99mA Note: Selectable when the input option is 2 or 5
- 24:±199.9mA Note: Selectable when the input option is 2 or 5
- 25:±1.999A Note: Selectable when the input option is 2 or 5
- 26: 5A Note: Selectable when the input option is 6 only
- 1V:1～5V Note: Selectable when the input option is B
- 2A:4～20mA Note: Selectable when the input option is B
- KC:Thermocouple-K sensor Note: Selectable when the input option is C
- JC:Thermocouple-J sensor Note: Selectable when the input option is C
- PA: Pt 100Ω/0.1℃ Note: Selectable when the input option is D
- PJ: Pt 100Ω/1℃ Note: Selectable when the input option is D

Power Supply
- 1 100～120VAC ±10% 50/60Hz
- 2 200～240VAC ±10% 50/60Hz
- 3 5～24VDC ±10%

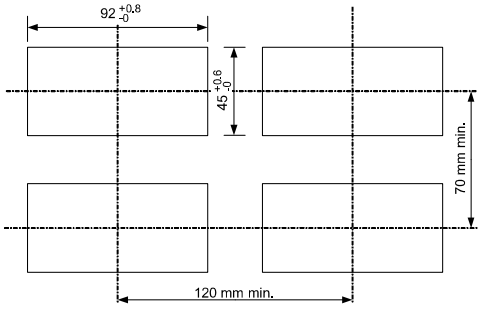
**Input**
- 1 DC voltage measurement
- 2 DC current measurement
- 4 AC voltage measurement/average
- 5 AC current measurement/average
- 6 AC large current measurement/average
- B Process signal measurement
- C Temperature measurement-thermocouple sensor
- D Temperature measurement - platinum resistance temperature sensor

## 7. Rating of Device

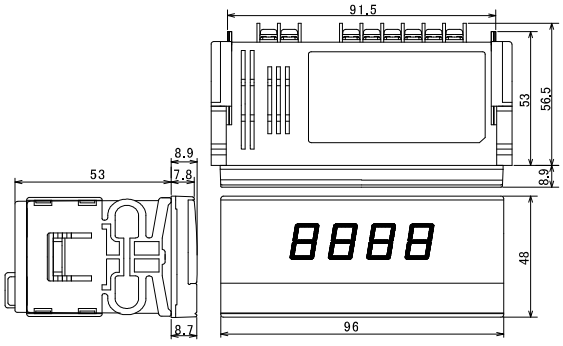
| | |
|---|---|
| Power Supply | :A11□□/100 to 120VAC ±10% 50/60Hz 1.5VA(TYP)<br>:A12□□/200 to 240AVC ±10% 50/60Hz 1.5VA(TYP)<br>:A13□□/5 to 24VDC ±10% 5V:230mA(TYP) 24V:100mA(TYP) |
| Withstand voltage | :1500VAC for one minute between the power terminal and each of the input/control terminals(for A11□□ and A12□□ models)<br>:500VDC for one minute between the power terminal and each of the input/control terminals(for A13□□ models) |
| Insulation resistance | :100MΩ or more at 500VDC between the above-noted terminals |
| Conformity standard | :EN61326-1(2006)EMI:class A, EMS:Controlled EM environments<br>:EN61010-1(2001)(However, 14 range is excluded.) |
| External dimensions | :96mm(W)×48mm(H)×65.4mm(D) |
| Weight | :150g(typ) for A11□□ and A12□□ models<br>:85g(typ) for A13□□ models |
| Input terminals | :11range DC specification:100VDC max<br>:12range AC specification:50VAC max, DC specification:100VDC max<br>:13range AC specification:50VAC max, DC specification:120VDC max<br>:14range AC specification:500VAC max, DC specification:500VDC max<br>:23range AC/DC specification:150mA AC<br>:24range AC/DC specification:500mA AC<br>:25range AC/DC specification:3A AC<br>:26range AC specification:8A AC<br>:1Vrange 100VDC max<br>:2Arange 50mADC max<br>:KCrange 5VDC max<br>:JCrange 5VDC max<br>:PArange 5VDC max<br>:PJrange 5VDC max |
| Control terminals | :5VDC/−1mA ±10% |

## 8. Mounting Method

### 8.1 Panel Cutout Dimensions

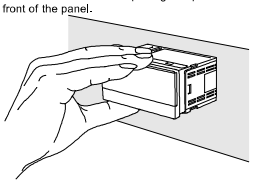



### 8.2 External Dimensions

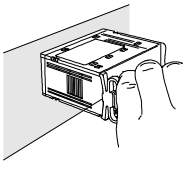



### 8.3 Panel Mounting Method

(1) With the mounting bands detached from the main unit, insert the main unit into the opening in a panel from the front of the panel.



(2) Then attach the mounting bands to the main unit from the rear of the panel for fixing.



### ⚠ CAUTION

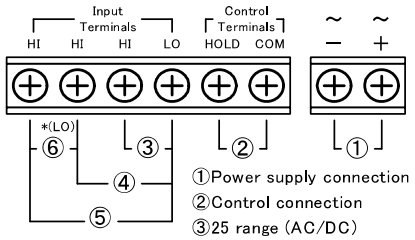
(1) Install and use the product in locations free from dust and dirt, chemicals harmful to electric components, corrosive gases, etc.

(2) If the digital panelmeter is installed in equipment, pay attention to the equipment's heat radition, etc., to keep the in-equipment temperature below 50 ℃.

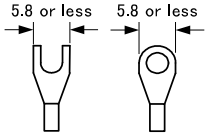
(3) Exercise care so that the product is not subject to vibrations or shocks.

## 9. Terminal Connection Method

### -AC measurement/DC measurement/Process signal measurement-




Compatible crimp



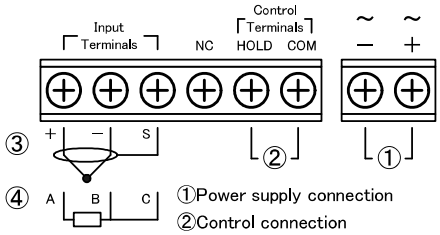

①Power supply connection
②Control connection
③25 range (AC/DC)
④13、14、24、2A range(AC/DC/Process signal)
⑤11、12、23、1V range (AC/DC/Process signal)
(11 is DC only)
⑥26 range (AC)
*The terminal position of LO is deferent at 26 range.

Notes:

< Voltage measurement unit (AC/DC) and Process signal measurement unit >
It is 1-range fixation. It is not possible to cahnge in Input range.
Please specify it when you order

< Current measurement unit (AC/DC) >
The measurement range can be changed by means of a terminal connection.
However, 26 range becomes only range fixation.

### -Temperature measurement-




①Power supply connection
②Control connection
③Thermocouple sensor connection
④Platinum resistance temperature sensor connection

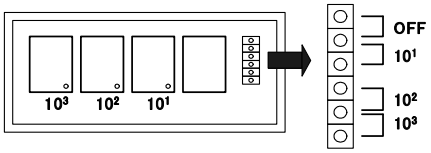
Notes:

< Temperature measurement unit (thermocouple/Platinum resistance) >
It is 1-range fixation. It is not possible to change in Input range.
Plaese specify it when you order.

## 10. Various Functions

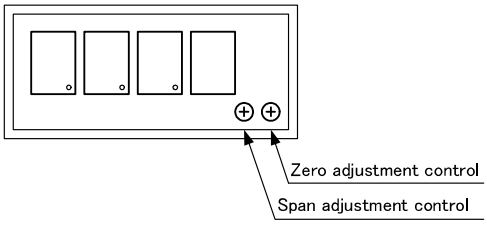
10.1 Hold function
Shorting the HOLD and COM terminals or bringing their potential to the "0" level allows the panelmeter to retain the reading provided immediately after the hold function is enabled. The panelmeter resumes measurement when the hold function is cancelled as necessary.
Note that the LO and COM terminals are connected to each other internally to share the same potential level and the utmost care should be exercised when controlling these terminals.

10.2 Decimal Point
The decimal point, which is turned off at factory shipment, can be set to your choice of position. To turn on the decimal point, first turn off the panelmeter and then remove the front panel and configure the selector socket located to the right of the display. The A1000 series panelmeter employs leading-zero suppression for showing 0's in the reading. Setting the decimal point eliminates unnecessary 0's from the reading. Be sure to turn off the panelmeter before changing the decimal point position.




## 11. Scaling and Calibration Method

The A1000 series panelmeter has been adjusted to within the given accuracy range for every measurement range before shipment.
However, you can fine-tune the accuracy range and calibrate the panelmeter by yourself. Before fine-tuning the panelmeter, remove the front panel, supply power to the panelmeter and warm it up fully(at least 20 minutes).




11.1 ZERO adjustment

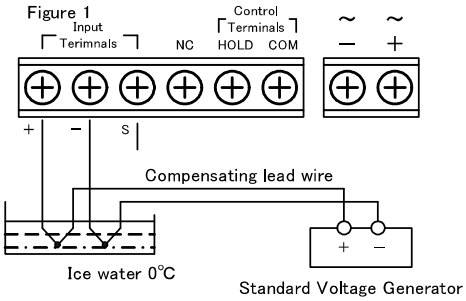
「DC voltage/current measurement equipment」
There is no zero adjustment control for this unit.
Short the input terminals appropriate for the measurement range to ensure that the reading is "0".

「AC voltage/current measurement equipment」
The terminal which suited the range is short-circuited, and it regulates by zero adjustment control so that a display may be set to 0.

「Process signal measurement equipment」
When you input 1V or 4mA into an input, please regulate to the display value expected by offset adjustment.

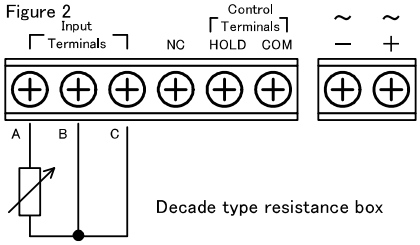
「Temperature measurement thermocouple sensor equipment」
Verify that the display shows 0 with reference voltage generator output set to 0.00mV.

Figure 1




「Temperature measurement Platinum resistance temperature equipment」
Turn the zero adjustment VR until the display shows 00.0 for the PA Type and 0 for the PJ Type with the resistance box set to 100Ω

Figure 2




11.2 SPAN Adjustment

「DC voltage/current, AC voltage/current measurement equipment」
Input a full-scale value(equipment to "1990") to the panelmeter and fine-tune the span using the adjustment control in the lower-right corner of the display.

「AC large current measurement equipment」
When you input 5A into an input, please regulate to the display value expected by full-scale adjustment.

「Process signal measurement equipment」
When you input 5V or 20mA into an input, please regulate to the display value expected by full-scale adjustment.
*Please do not perform the order of Zero Adjustment and full-scale conversely.

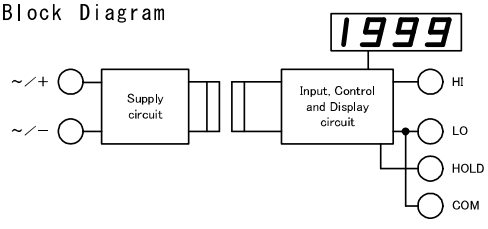
「Temperature measurement thermocouple sensor equipment」
Please set the reference voltage generator output to a full-scale, near value by the composing Figure 1.
Afterwards, please adjust it by the span volume

| Sensor | Display | Input voltage |
|---|---|---|
| KC | 1000℃ | 41.276mV |
| JC | 400℃ | 21.848mV |

「Temperature measurement Platinum resistance temperature equipment」
Please set the resistance of the dial resistor to a full-scale, near value by composing Figure 2.
Afterwards, please adjust it by the span volume.

| Sensor | Display | Input resistance |
|---|---|---|
| PA | 199.9℃ | 175.47 Ω |
| PB | 600℃ | 313.59 Ω |

## 12. Block Diagram




watanabe
WATANABE ELECTRIC INDUSTRY CO., LTD.
6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
Phone: (81)3-3400-6141
Homepage http://www.watanabe-electric.co.jp/en/